



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/579,542	05/26/2000	Cheng Chung Lin	TSMC2000-079	7369

28112 7590 11/26/2003

GEORGE O. SAILE & ASSOCIATES  
28 DAVIS AVENUE  
POUGHKEEPSIE, NY 12603

EXAMINER

VINH, LAN

ART UNIT PAPER NUMBER

1765

DATE MAILED: 11/26/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/579,542

Applicant(s)

LIN ET AL.

Examiner

Lan Vinh

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 02 September 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 14-20 is/are allowed.
- 6) ☒ Claim(s) 1-7 and 9-12 is/are rejected.
- 7) ☒ Claim(s) 8 and 13 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-7, 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moghadam et al (US 6,413,583) in view of Gaughan et al (US 6,210,745)

Moghadam discloses a method for depositing a low dielectric constant film. This method comprises the steps of:

depositing a layer of low k oxidized organosilane/ black diamond ( see prior art of record for evidence of this basis ) by plasma enhanced chemical vapor deposition (PECVD) using a gaseous mixture of methylsilane, nitrous oxide and helium at low level of RF power at 10 W to form a layer having a thickness ( col 13, lines 37-49; col 14, lines 10-40 ), which reads on depositing a low power level of black diamond through PECVD from a gaseous mixture of methyl silane and nitrous oxide enhanced by a plasma helium at a power applied to only the plasma/power level that is less than about 70 W to form a layer having a thickness

depositing a layer of low k oxidized organosilane/ black diamond by plasma enhanced chemical vapor deposition (PECVD) using a gaseous mixture of methylsilane, nitrous oxide, oxygen and helium at a level of RF power at 20-200 W (col 8, lines 17-20), which reads on then/with no intervening step depositing a high power

level of black diamond through PECVD from a gaseous mixture of methylsilane, nitrous oxide, oxygen enhanced by a plasma helium at a power applied to only the plasma/power level between about 70 W-200 W to form a layer having a thickness

Unlike the instant claimed invention as per claims 1, 3, 4, 5, 9, 10, Moghadam does not disclose repeating the steps of depositing the low dielectric constant material for 10 seconds to reach a specific thickness of the low dielectric constant material layers although Moghadam discloses depositing the oxidized organosilane layer at about 2000 Angstroms per minute (col 14, lines 53-54)

Gaughan, in a method of quality control for CVD, discloses that the deposition processes/steps can be repeated for about 10 sec to achieve a film thickness (col 8, lines 63-65, col 9, lines 1-5, fig. 5A)

Since both Moghadam and Gaughan are concerned with CVD method, one skilled in the art would have found it obvious to modify Moghadam method by repeating the deposition steps to achieve a thickness as per Gaughan because Gaughan states that the overall thickness of the film may be controlled by repeating the deposition/plasma treatment step (col 9, lines 6-8)

Regarding claims 11, 12, Moghadam discloses flowing 5-500 sccm of methylsilane, 5-2000 sccm of nitrous oxide, 200-2000 sccm of helium, (col 14, lines 20-25) and 2000-6000 sccm of oxygen, which overlaps the claimed ranges.

The limitations of claims, 2-7, 10 have been discussed above

***Allowable Subject Matter***

3. Claims 8, 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: Regarding claims 8, 13, the applicants have presented a persuasive argument that the cited prior art of record fail to teach depositing a first layer of low k dielectric constant material by means of PECVD at a first level of power applied to only the plasma wherein the layer of low dielectric constant material has a flat band voltage that is less than about  $-3$  v. The cited prior art of Huang (US 6,541,369) only discloses depositing a first layer of dielectric material by means of CVD wherein the dielectric layer has a flat band voltage that is less than about  $-15$  v.

Claims 14-20 are allowed.

The following is an examiner's statement of reasons for allowance:

Regarding claim 14, the cited prior art of record fails to disclose the step of depositing onto the low power layer of black diamond a high power layer of black diamond. The closest prior art of Cheung et al (US 6,287,990) discloses depositing a high power FSG layer 510 under the low power layer of oxidized organosilane/black diamond 514 (fig. 7)

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Li et al (US 6,168,726) discloses that oxidized organosilane is a low k dielectric with a trade name of black diamond (col 3, lines 46-53 )

***Response to Arguments***

5. Applicant's arguments with respect to claims 1-7, 9-12 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 703 305-6302. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 703 305-2667. The fax phone numbers for the organization where this application or proceeding is assigned are 703 872-9310 for regular communications and 703 872-9311 for After Final communications.



LV  
November 21, 2003